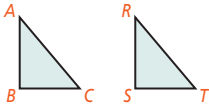




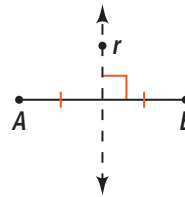
## Vocabulary

### Review

1.  $\triangle ABC$  is congruent to  $\triangle RST$ . Name the side that *corresponds* to  $\overline{BC}$ .



2. In the diagram,  $r$  is the \_\_\_\_\_ of  $\overline{AB}$ .



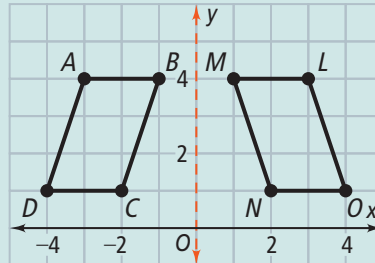
### Vocabulary Builder

**reflection** (noun) ri flek shuh n

**Related Words:** transformation, mirror image, flip, pre-image, image

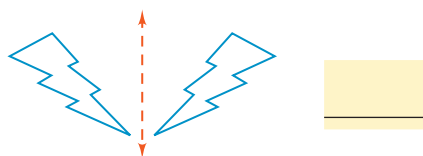
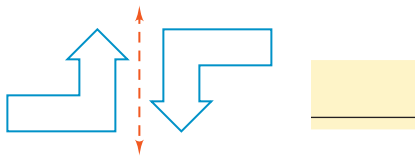
**Main Idea:** A reflection is a transformation which flips a figure over a line of reflection resulting in a mirror image of the original figure. The orientation of the figure reverses.

**Example:** Figure  $ABCD$  was reflected over the  $y$ -axis to form figure  $LMNO$ . Figure  $LMNO$  is a reflection of figure  $ABCD$ .

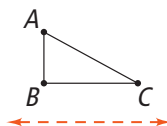


### Use Your Vocabulary

3. Tell whether the pair of figures shows a reflection. Write *yes* or *no*.



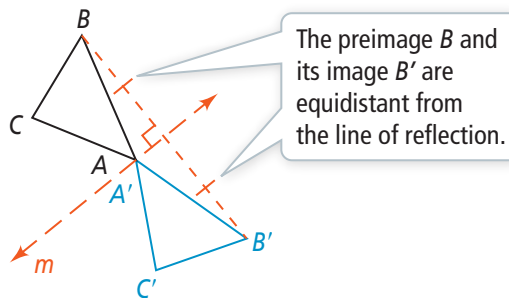
4. Reflect  $\triangle ABC$  over the line.  
Draw and label its reflection.



## Key Concept Reflection Across a Line

**Reflection** across a line  $m$ , called the **line of reflection**, is a transformation with these two properties:

- If a point  $A$  is on line  $m$ , then the image of  $A$  is itself (that is,  $A' = A$ ).
- If a point  $B$  is not on line  $m$ , then  $m$  is the perpendicular bisector of  $\overline{BB'}$ .
- You write the reflection across  $m$  that takes  $P$  to  $P'$  as  $R_m(P) = P'$ .



Reflections preserve distance and angle measures.

5. If  $R_m(A) = A'$ , and  $R_m(B) = B'$ , then  $AB =$  .
6. If  $R_m(\angle ABC) = \angle A'B'C'$ , then  $m\angle$    $= m\angle$  .
7. If  $AC = 3$  units,  $A'C' =$   units.
8. If  $m\angle$    $= 55^\circ$ ,  $m\angle$    $=$  .

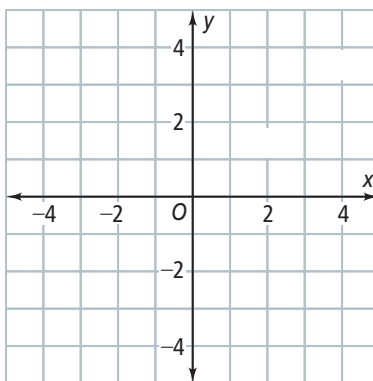


### Problem 1 Reflecting a Point Across a Line

Point  $P$  has coordinates  $(3, 4)$ .

**Got It?**  $R_{x=1}(P) = P'$ . What are the coordinates of the image  $P'$ ?

9. Graph point  $P$  and the line of reflection  $x = 1$ .



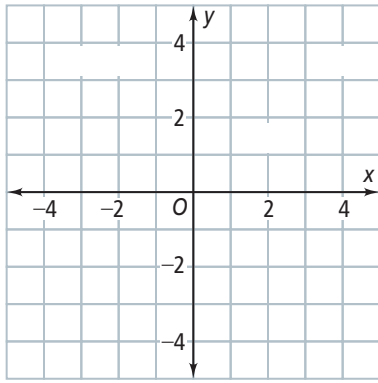
10. Describe point  $P$  in relation to the line of reflection.

Point  $P$  is  units to the **right/left** of the line of reflection  $x = 1$ .

11. Describe image  $P'$  in relation to the line of reflection.

Point  $P$  and image  $P'$  are the same distance from the line of reflection but in opposite directions, so image  $P'$  is  units to the **right/left** of the line of reflection  $x = 1$ .

12. Graph image  $P'$ . Write its coordinates.



- Move left along the line through  $P$  that is perpendicular to the line of reflection.
- Stop when the distances of  $P$  and  $P'$  to the line of reflection are the same.

The coordinates of  $P'$  are ( , ).



## Problem 2 Graphing a Reflection Image

**Got It?** Graph  $\triangle ABC$ , where  $A(-3, 4)$ ,  $B(0, 1)$ , and  $C(4, 2)$ . Graph and label  $R_{x\text{-axis}}(\triangle A'B'C')$ .

13. Graph  $\triangle ABC$ .

Show the  $x$ -axis as the dashed line of reflection.

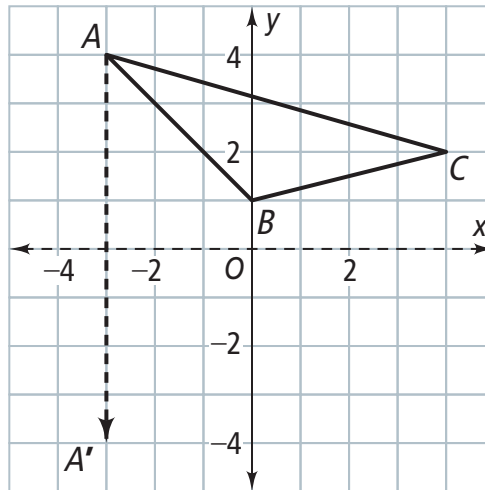
14. Draw  $\triangle A'B'C'$  following the given STEPS.

Step 1: Draw a line perpendicular to the line of reflection that passes through point  $A$ .

Step 2: Locate  $A'$  so that the  $x$ -axis is the perpendicular bisector of  $\overline{AA'}$ .

Step 3: Repeat steps 1 and 2 for points  $B$  and  $C$ .

Step 4: Connect points  $A'$ ,  $B'$ , and  $C'$  to form  $\triangle A'B'C'$



## Problem 4 Using Properties of Reflections

In the diagram,  $R_t(G) = G$ ,  $R_t(H) = J$ , and  $R_t(D) = D$ .

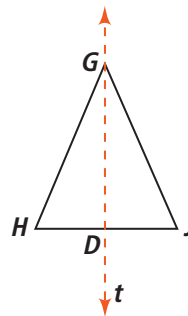
**Got It?** Can you use properties of reflections to prove that  $\triangle GHJ$  is equilateral? Explain how you know.

15. How do you know that a triangle is an equilateral triangle?

\_\_\_\_\_

16. Use the properties of reflections to compare the side lengths.

$GH =$  and  $HD =$



For Exercises 17 and 18, circle the correct answer.

17. Can you determine if  $HJ = GH = GJ$  using the properties of reflection? **yes / no**

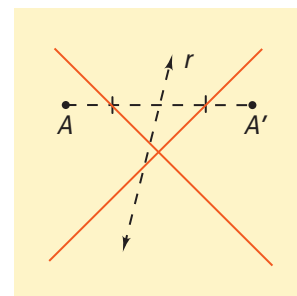
18. The properties of reflections **can/cannot** be used to prove that  $\triangle GHJ$  is equilateral.



## Lesson Check • Do you UNDERSTAND?

**Error Analysis** A classmate sketched  $R_r(A) = A'$  as shown in the diagram.

- Explain your classmate's error.
- Copy point  $A$  and line  $r$  and show the correct location of  $A'$ .

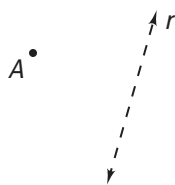


19. Use the properties of reflections to describe how the line of reflection  $r$  is related to  $\overline{AA'}$ .

Line  $r$  is the  of  $\overline{AA'}$ .

20. Examine the classmate's drawing. What was the classmate's error? Explain.

21. Draw the correct location of  $A'$ .



## Math Success

Check off the vocabulary words that you understand.

☐ transformation      ☐ reflection      ☐ line of reflection

Rate how well you can use the properties of reflections.

